

- 12 -

Claims

1. An articulated boom comprising:
5 a support arm defining a number of hingedly-connected joints, the arm being adapted and arranged to carry an antenna reflector so that in use, the reflector can move between a first stowed position in which the reflector is in folded condition and a second deployed position in which the reflector is in deployed condition.
2. An articulated boom for connection to a spacecraft vehicle comprising:
10 a support arm defining a number of hingedly-connected joints, the arm being adapted and arranged to carry an antenna reflector so that in use, the reflector can move between a first stowed position in which the reflector is nested within a predetermined volume of the spacecraft vehicle and a second deployed position in which the reflector is deployed
15 in space.
3. An articulated boom as claimed in claim 1 or claim 2 wherein the support arm includes a dog-leg for permitting stowage of the reflector in said first stowed position, the dog-leg being adapted and arranged to permit the support arm of the boom to be positioned at the circumference of the
20 reflector when in stowed condition.
4. An articulated boom as claimed in claim 1 or claim 2 or claim 3 wherein there are four single-axis hingedly-connected joints.
5. An articulated boom as claimed in any preceding claim wherein one or more of said hingedly-connected joints comprises an articulated stepper
25 motor harmonic drive unit.
6. An articulated boom as claimed in any preceding claim wherein one or more of said hingedly-connected joints comprises a spring-operated mechanical hinge.
7. An articulated boom as claim in any preceding claim further comprising
30 antenna pointing means.

- 13 -

8. An articulated boom as claimed in claim 7 wherein the antenna pointing means relies upon application of a 2-axis antenna pointing mechanism.
9. An articulated boom as claimed in claim 8 wherein the 2-axis antenna pointing mechanism functions are separately mounted on the support arm and the reflector.
10. An articulated boom as claimed in any preceding claim wherein the support arm is configured to be sufficiently long so as to carry an antenna reflector of around 3.5 metres diameter with an associated focal length of around 7 metres.
11. An articulated boom as claimed in any preceding claim wherein the hingedly-connected joints are bolted using metal bracket means with a degree of flexibility to accommodate for changes in the material properties of the boom in response to temperature variations between +140°C and -180°C.
12. An articulated boom as claimed in any of claims 2 to 11 wherein one end of the support arm is mounted to the associated feed structure of the spacecraft vehicle and the opposing end of the support arm is mounted to the antenna reflector.
13. An articulated boom as claimed in claim 12 wherein the reflector when in stowed position is foldably mounted to a sidewall of the spacecraft vehicle on a plurality of hold-down points, which hold-down points are operably released prior to deployment of the reflector.
14. An articulated boom as claimed in claim 13 wherein said hold-down points are formed such as to provide a degree of compliance in a number of predetermined directions, permitting the boom and the spacecraft structure not to impart unwanted thermal expansion loads on each other.
15. A satellite or spacecraft vehicle incorporating into one/each of its sides two or more booms of the type claimed in any of claims 1 to 14, enabling two or more reflectors to be deployed from one/each side of the satellite/spacecraft vehicle.

- 14 -

16. A satellite or spacecraft vehicle as claimed in claim 15 wherein the support arms of the two or more booms are positioned at the circumference of the associated reflectors when in stowed condition, such as to allow the reflectors to be stacked together within a space defined by the associated launch vehicle fairing.
17. A satellite or spacecraft vehicle incorporating into one/each of its sides a hingedly-mounted support structure including an antenna reflector with boom of the type claimed in any of claims 1 to 14.
18. A satellite or spacecraft vehicle as claimed in claim 17 wherein the associated feed structure is mounted to a separately-formed floor of the satellite/spacecraft vehicle.
19. A satellite or spacecraft vehicle incorporating into one/each of its sides
- (a) a first hingedly-mounted support structure including an antenna reflector with boom of the type claimed in any of claims 1 to 14; and
 - (b) a second different hingedly-mounted support structure for carrying a plurality of antenna reflectors.
20. A reflector system for space-based applications incorporating an antenna reflector with supporting boom as claimed in any of claims 1 to 14.
21. An antenna structure incorporating a reflector system as claimed in claim 20.
22. An articulated boom or a number of articulated booms substantially as herein described with reference to the accompanying drawings.
23. A satellite or spacecraft vehicle with articulated boom(s) substantially as herein described with reference to the accompanying drawings.
24. A method of stacking a plurality of deployable antenna reflectors in spacecraft, comprising:
- providing a first antenna reflector with boom of the type claimed in any of claims 1 to 14;

- 15 -

moving said first antenna reflector to a first nesting position close to a sidewall of the spacecraft in such a manner that its supporting boom follows the circumference of the reflector along a first path;

5 providing a second antenna reflector with boom of the type claimed in any of claims 1 to 14; and

10 moving said second antenna reflector to a second nesting position close to the sidewall of the spacecraft in such a manner that its supporting boom follows the circumference of the reflector along a second path and such that the first and second reflectors are disposed in juxtaposition in stacked relationship.

25. A method of stacking a plurality of deployable antenna reflectors in spacecraft with articulated booms substantially as herein described with reference to the accompanying drawings.